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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/815,431

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Prashant Sethi

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08/16/2006

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EXAMINER

ZAMAN, FAISAL M

ART UNIT

PAPER NUMBER

2112

DATE MAILED: 08/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 10/815,431	<b>Applicant(s)</b> SETHI ET AL.	
	<b>Examiner</b> Faisal Zaman	<b>Art Unit</b> 2112	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 02 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date. _____  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Response to Amendment***

#### ***Specification***

1. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: there is no mention of an “article comprising a computer-accessible medium”, as recited in Claims 11-20 and Claims 28-35, in the specification.

Further, there is no mention of a “memory controller”, as recited in Claims 28, in the specification.

#### ***Drawings***

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “memory controller” of Claim 28 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate

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changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 101***

3. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 11-20 and 28-35 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. Applicant does not specifically define a "computer-accessible medium" in the specification. Since a computer-accessible medium in the prior art is quite well known to be a tangible medium or a transmission medium, such as a carrier wave or a radio frequency signal, the examiner suggests Applicant specify in the claim a "computer-accessible *storage* medium", instead of "computer-accessible medium".

Appropriate corrections are therefore required.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. **Claims 1-3, 7, 8, and 10** are rejected under 35 U.S.C. 102(e) as being anticipated by Madukkarumukumana et al. ("Madukkarumukumana") (U.S. Patent Publication No. 2005/0125580).

**Regarding Claim 1**, Madukkarumukumana discloses a method comprising:

Receiving an interrupt message from a device (Figure 1, item 120, Page 3, paragraph 24) via a shared interrupt interface (Page 3, paragraph 30, "integrated circuit to steer and redirect interrupts"), wherein the device supports a plurality of operating entities (Figure 2, items 248/258/268/269; ie. the interrupt generating device 290 has the ability to send interrupts to the various virtual machines);

Checking one or more status registers associated with the shared interrupt interface (Figure 2, item 212, Page 3, paragraph 31, "participant table" in Madukkarumukumana is considered equivalent to the registers of the current application) to identify the device (Page 3, paragraph 24, since the I/O hub in Madukkarumukumana can associate interrupts generated by a particular device with a

virtual machine ID, it is understood that this would allow the system of Madukkarumukumana to identify the interrupt generating device); and

Transmitting an indication of the interrupt message to one or more selected operating entities associated with the identified device (Figure 1, item 160, Page 3, paragraph 27, the processor running a virtual machine in Madukkarumukumana is considered equivalent to the "operating entities" in the current application), wherein the selected operating entities comprise a subset of the plurality of operating entities (Figure 2, items 248/258/268/269, Page 3, paragraphs 0030-0033); ie. the interrupt is sent to only one of the plurality of virtual machines).

**Regarding Claim 2**, Madukkarumukumana discloses wherein the one or more selected operating entities comprises one or more virtual machines (Figure 2, items 245, 255, and 265, Page 3, paragraphs 30 and 33).

**Regarding Claim 3**, Madukkarumukumana discloses wherein the one or more selected operating entities comprises threads in a multi-threaded operating environment (Page 3, paragraph 32, it is understood that the hyper-threaded processor of Madukkarumukumana would be used in a multi-threaded operating environment).

**Regarding Claim 7**, Madukkarumukumana discloses wherein the one or more operating entities comprise virtual machines registered to have access to the identified device (Page 2, paragraphs 21-22).

**Regarding Claim 8**, Madukkarumukumana discloses further comprising executing an interrupt service routine chain with each of the one or more virtual machines (Page 5, Claim 13).

**Regarding Claim 10**, Madukkarumukumana discloses wherein transmitting an indication of the interrupt message to one or more operating entities based on the identity of the device comprises transmitting an identity of the device (Page 3 paragraph 24, and Page 4 Claim 1, it is understood that when an interrupt is associated with a VM-ID by the IO hub in Madukkarumukumana and then sent to the associated virtual machine, the identity of the device generating the interrupt is also transmitted to the virtual machine).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claim 4-6, 9, and 11-35** are rejected under 35 U.S.C. 103(a) as being unpatentable over Madukkarumukumana in view of Le (U.S. Patent No. 6,908,038).

Madukkarumukumana discloses all of the elements as stated above, except Madukkarumukumana does not specify what type of register, bus, or bus standard is

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used. The Examiner takes official notice that the PCI bus standard, PCI Express bus standard, and PCI standard in general are well-known types of standards available in the prior art at the time of the applicant's claimed invention, as evidenced by Le (Column 1, lines 41-60).

Accordingly, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the PCI bus standard, PCI Express bus standard, and/or the PCI standard for the system disclosed by Madukkarumukumana.

**Claims 11-20** are directed to an article comprising a computer accessible medium, **Claims 21-27** are directed to an apparatus of the method of Claims 1-10, and **Claims 28-35** are directed to a system of the method of Claims 1-10.

Madukkarumukumana and Le teach, either alone or in combination as stated above, the method as set forth in Claims 1-10. Therefore, Madukkarumukumana and Le also teach, either alone or in combination as stated above, an article comprising a computer accessible medium as set forth in Claims 11-20. Further, Madukkarumukumana and Le teach, either alone or in combination as stated above, teaches an apparatus and system as set forth in Claims 21-27 and Claims 28-35, respectively.

### ***Response to Arguments***

8. Applicant's arguments filed August 2, 2006 have been fully considered but they are not persuasive.



Regarding Applicant's argument that "Madukkarumukumana does not disclose checking a status register of a shared interrupt interface to identify a device", as the examiner noted in the Office Actions dated 10/27/2005 and 3/29/2006, since the I/O hub (e.g. shared interrupt interface) 210 in Madukkarumukumana can associate interrupts generated by a particular device with a virtual machine ID (using the participant table 212 [which is in fact associated with the shared interrupt interface 210 since it is located within shared interrupt interface 210]), it is understood that this would allow the system of Madukkarumukumana to identify the interrupt generating device (see Madukkarumukumana, Page 3, paragraph 0024, and paragraph 0031). Associating a VM-ID with an interrupt generating device 290 and the virtual machines 248/258/268/269 to which the interrupt will be sent not only identifies the interrupt generating device, but also identifies the device (ie. the virtual machine and processor associated with the virtual machine) to which the interrupt will be sent.

As to Applicant's argument that Madukkarumukumana does not specifically disclose checking a status *register*, as was noted in the original Office Action, the "participant table" in Madukkarumukumana is considered equivalent to the status registers of the current application, as is well known in the art, evidenced by Cave (U.S. Patent No. 6,314,524) (Column 5, lines 62-66). Further, Madukkarumukumana mentions that the table can be replaced by an "equivalent structure" (see, Madukkarumukumana, Page 2, paragraphs 0020 and 0022).

Therefore, the pending claims stand as previously rejected.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faisal Zaman whose telephone number is 571-272-6495. The examiner can normally be reached on Monday thru Friday, 8 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rehana Perveen can be reached on 571-272-3676. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

fmz

  
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SUPERVISORY PATENT EXAMINER  
8/15/06